Original Report

Factors related to the continuation of smoking among pregnant women: a cross-sectional study in a Japanese city

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Objective: To explore factors related to the continuation of smoking among pregnant women.

Methods: The study population of this cross-sectional study consisted of pregnant women who visited the health center in a Japanese city between April 1, 2004, and March 31, 2006, to officially register their pregnancy. A total of 2,533 among 2,536 eligible pregnant women (99.9%) participated in the study. Using a self-administered questionnaire, 2,511 (99.0%) valid responses were collected. Factors associated with the continuation of smoking at pregnancy notification were investigated using χ^2 tests. Multivariate logistic regression analysis with forced entry was then performed, using independent variables selected from the survey items based on bivariate analyses and smoking status at pregnancy notification as the dependent variable.

Results: Current smokers numbered 232 (9.2%), and 397 (15.8%) women quit smoking after learning they were pregnant. Continuation of smoking at pregnancy notification was significantly associated with the following four variables: partner's smoking, family budget concerns, having at least one previous pregnancy, and submitting notification in the twelfth week of pregnancy or later.

Conclusion: Efforts to reduce the smoking rate among partners of pregnant women and to resolve economic anxiety may be effective strategies to reduce the number of pregnant women who continue to smoke after officially registering their pregnancy.

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Key words: smoking, pregnant woman, notification of pregnancy, smoking cessation

I Introduction

According to the Ministry of Health, Labour and Welfare's National Health and Nutrition Survey[1)], the smoking rate among Japanese men declined from 59.7% in 1986 to 32.2% in 2010. Among women, however, the rate rose from 8.6% in 1986 to 12.0% in 2004, before declining to 8.4% in 2010. In Japan, a woman's age at childbirth is between 20 and 40 years in 99% of cases[2)], and smoking rates in these age groups are higher than at other ages (12.8% current smoking among women in their 20s, 14.2% for those in their 30s, and 13.6% for those in their 40s[1)]).

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According to the National Growth Survey on Preschool Children[3], the smoking rate among pregnant women rose from 5.6% in 1990 to 10.0% in 2000, before falling to 5.0% in 2010.

An international systematic review[4] found that factors associated with smoking among pregnant women include having a partner who smokes, having a large number of children, a high rate of prepregnancy tobacco consumption, and deficiencies in prenatal care. A further Japanese study[5] also reported that pregnancy at a young age, fewer years of schooling, multiparity, exposure to passive smoking, short sleep duration, and alcohol consumption are associated with smoking during pregnancy. Notably, the common factor emerging from both these studies is multiparity. In addition, other Japanese studies[6,7] have shown that partner's smoking status is an important factor influencing smoking in pregnant women.

Smoking during pregnancy is associated with various detrimental health outcomes including sudden infant death syndrome (SIDS)[8] and chronic respiratory diseases in children[9]. Smoking cessation during pregnancy is thus a critically important objective. Accordingly, an understanding of the factors associated with smoking during pregnancy is necessary to provide appropriate and effective support for smoking cessation in expectant mothers.

Most studies on smoking among pregnant women have only addressed pregnant women at medical institutions or as a subset living in a particular area. There have been few studies — and none from Japan — that have investigated all pregnant women in a whole municipality, at which level support for smoking cessation during pregnancy would most feasibly be provided. The objective of this study was thus to explore the factors related to continuation of smoking among pregnant women in a Japanese municipality.

Ⅱ Methods

1. Survey methods and participants

This study comprised pregnant women who visited the health center in a Japanese city between April 1, 2004, and March 31, 2006, to submit the official "notification of pregnancy" form required to access maternal and child health services in Japan. A total of 2,533 out of 2,536 eligible pregnant women (99.9%) participated in the study and completed a self-administered questionnaire. We excluded 22 participants whose responses were insufficient; thus 2,511 (99.0%) valid responses were analyzed. A city employee provided assistance to the participating women in completing the questionnaires when necessary.

2. Survey items

The main survey items were as follows: 1) smoking status at the time of learning pregnancy status and at the time of submitting the pregnancy notification; 2) partner's smoking status; 3) age; 4) number of weeks pregnant at submission of the pregnancy notification; 5) previous pregnancies, miscarriages, stillbirths or abortions; 6) course of the pregnancy; 7) pregnancy intention; and 8) existing family budget concerns.

3. Analytical methods

Associations between the survey items and smoking status at pregnancy notification submission among women who smoked before knowing they were pregnant were investigated using the χ^2 test. Then, multivariate logistic regression analysis with forced entry was performed. All survey items showing significant associations in the bivariate analysis were included as independent variables, with smoking status used as the dependent variable. In addition, obstetric history among multigravidae was investigated using the χ^2 test. SPSS

12.0J for Windows (SPSS, Inc., Chicago, IL, USA) was used for all analyses, with the level of significance set at 5%.

In this study, women who had smoked before coming to know they were pregnant and who continued to smoke at the time of pregnancy notification submission were referred to as "smokers". Those who had quit smoking by the time they submitted their pregnancy notification were considered "quitters". The smoking status of women who were not active smokers prior to learning of their pregnancy was referred to as "nonsmoking".

4. Ethical considerations

Prior to the implementation of this study, the survey objectives and other study-related matters were explained to the participants by public health nurses, midwives, nurses or nutritionists. Written informed consent was obtained after an oral explanation that participation was voluntary rather than compulsory and that personal information would be protected.

Ⅲ Results

1. Characteristics of participants

With respect to smoking status, 629 women (25.0%) had been smokers prior to learning of their pregnancy. Among them, 397 (63.1%) were "quitters" and 232 (36.9%) were "smokers". In terms of the participants' partners, 1,590 (63.3%) were smokers (Table 1).

Among 629 women who were smokers when they first learned of their pregnancy, the mean age was 28.1 (SD 5.6: range 14 to 48) years. The mean age of their partners was 29.9 (SD 6.4: range 16 to 59) years. Five hundred women (79.5%) were in their eleventh or earlier week of pregnancy, and 396 (63.0%) had previously experienced a pregnancy. Among those with a prior pregnancy experience, 89 women (14.1%) had experienced a miscarriage, 7 (1.1%) a stillbirth, and 118 (18.8%) an abortion. The number of women who expressed family budget concerns was 68 (10.8%).

Table 1 Smoking status of pregnant women and their partners

n=2,511

		n	%
Pregnant women			
Before knowing pregnancy	Nonsmoking	1,882	75.0
	Smoking	629	25.0
At the submission of pregnancy notification	Nonsmoking	1,882	75.0
	"Quitter"	397	15.8
	"Smoker"	232	9.2
Their partners	Nonsmoking	811	32.3
	Quit smoking	73	2.9
	Smoking	1,590	63.3
	NA	37	1.5

2. Factors associated with smoking continuation

Out of seven survey items, five were related to smoking continuation at pregnancy notification submission by the χ^2 test: having a partner who smokes ($p=0.02$), family budget concerns ($p<0.01$), previous experience of pregnancy ($p<0.01$), late submission of pregnancy notification ($p<0.01$), and unintended pregnancy ($p=0.01$) (Table 2). Multivariate logistic regression analysis with these five items as independent variables showed that women whose partners were "smokers" (odds ratio [OR]=2.02, 95% confidence interval [CI] 1.17–3.50), who expressed family budget concerns (OR=1.98, 95% CI 1.14–3.42), who had experienced at least one previous pregnancy (OR=1.81, 95% CI 1.25–2.61), or who submitted a pregnancy notification in their twelfth week of pregnancy or later (OR=1.81, 95% CI 1.18–2.78) were significantly more likely to be "smokers" than the reference group (Table 2). Finally, among 353 multigravidae, a significant association was seen between smoking status and

Table 2 Smoking status and associated factors in the women who had smoked before knowing pregnancy

n = 552[a]

	"Smokers" (n = 195)		"Quitters" (n = 357)		χ^2 Value	p Value	Adjusted odds ratio	95% CI
	n	%	n	%				
Partners smoking status								
Smoking	176	90.3	297	83.2	5.13	0.02*	2.02	1.17–3.50
Nonsmoking[†]	19	9.7	60	16.8			1	
Family budget concerns								
Yes	32	16.4	31	8.7	7.45	<0.01**	1.98	1.14–3.42
No[†]	163	83.6	326	91.3			1	
Previous experience of pregnancy								
Yes	141	72.3	212	59.4	9.14	<0.01**	1.81	1.25–2.61
No[†]	54	27.7	145	40.6			1	
Weeks of pregnancy								
12 weeks or more	45	23.1	51	14.3	6.78	<0.01**	1.81	1.18–2.78
11 weeks or less[†]	150	76.9	306	85.7			1	
Unintended pregnancy								
Yes	66	33.8	85	23.8	6.39	0.01*	1.43	0.97–2.10
No[†]	129	66.2	272	76.2			1	
Age of pregnant women								
20 years and younger	13	6.7	20	5.6	0.25	0.61		
21 years and older	182	93.3	337	94.4				
The course of pregnancy								
Unwell	6	3.1	13	3.6	0.12	0.72		
Well	189	96.9	344	96.4				

[a] The participants who left some items on the questionnaire unanswered were excluded from the analysis.
** $p<0.01$, * $p<0.05$
[†] Reference group

Table 3 Comparison between "smokers" and "quitters" among multigravidae

n = 353[a]

	"Smokers"		"Quitters"		χ^2 Value	p Value
	n	%	n	%		
Experience of miscarriage						
Yes	29	20.6	55	25.9	1.35	0.24
No	112	79.4	157	74.1		
Experience of stillbirth						
Yes	4	2.8	3	1.4	0.88[b]	0.34
No	137	97.2	209	98.6		
Experience of abortion						
Yes	54	38.3	56	26.4	5.57	0.01*
No	87	61.7	156	73.6		

[a] The number of participants with one or more previous pregnacies
[b] Fisher's exact test
* $p<0.05$

abortion (p=0.01), and "smokers" had a higher frequency of previous abortions than did "quitters" (Table 3).

Ⅳ Discussion

Multivariate logistic regression analysis revealed four factors to be associated with smoking continuation at the time of pregnancy notification submission. First, partner's smoking status was associated with the highest odds ratio for continuing smoking in this study. Presence of a smoking partner has also been reported as a risk factor for smoking in an international systematic review[4], as well as in Japan-based studies conducted by Ohida et al.[6] and Yasukouchi & Sato[7]. It is thus especially imperative that smoking cessation support be offered to smoking women whose partners also smoke, as such individuals have shown a high tendency to continue smoking during pregnancy.

Second, "smokers" had a higher frequency of reporting family budget concerns than did "quitters". Mckee et al.[10] has reported that women are more likely to continue smoking when faced with financial problems. Because they are so focused on their family budget concerns, it may be difficult for such women to turn their attention to smoking cessation. Hence, when offering smoking cessation support to "smokers", providing information on the use of social resources might also be helpful to improve outcomes.

Third, "smokers" had a higher frequency of previous pregnancy experience than did "quitters", a finding in line with those of an international systematic study[4] and a Japanese study[5]. This might be either because the women had not quit smoking during their previous pregnancy, or because they re-started after giving birth. Tanaka & Saito[11] have reported that the rate of successful smoking cessation is higher in primigravidae than in multigravidae. These findings suggest that, in addition to offering support for smoking cessation to multipravidae, it might be important to enhance support for primigravidae, so that they do not eventually fall into this category of continued smoking through multiple pregnancy experiences.

Fourth, "smokers" tended to submit their pregnancy notification later (in the twelfth week of pregnancy or later) than did "quitters". Although the timing of pregnancy notification submission was one of the factors related to smoking continuation in this study, we could not find any previous reports with similar findings. In this study, nearly 80% of pregnancy notifications were submitted by the eleventh week. In Japan, 94.3% of abortions take place before or during the eleventh week of pregnancy[12]. However, no significant relation was found between smoking status and the item concerning intended pregnancy. Therefore, this factor remains a subject for future clarification regarding its association with continued smoking during pregnancy.

Because this study was conducted in only one Japanese municipality, our results might have been skewed by regional characteristics. The smoking rate in our study was almost the same as the national rate for pregnant women in Japan[3,6], but the smoking rate of their partners might have been higher in our study, which could have influenced the results. Additionally, smoking status as measured in this study might lack validity because it was evaluated solely by self-report. Moreover, participants were regarded as "smokers" and "quitters" based on their smoking status only at the time of pregnancy notification submission. Therefore, we cannot rule out the possibility that their smoking status might have changed somewhat during the course of the pregnancy.

It has also been reported that smoking status is related to educational background and the occupation of both pregnant women and their partners[13]. These factors could also affect smoking among pregnant women, but they were not investigated in this study. In addition, smoking rates among both men and women have decreased since 2006, suggesting that rates among pregnant women may also have decreased since the present data were collected, during the period between April 2004 and March 2006.

V Conclusion

Efforts to reduce the smoking rate among partners of pregnant women and to resolve economic anxiety represent potentially effective strategies for decreasing the number of pregnant women who continue to smoke at the time of pregnancy notification submission in Japan.

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References

1) Ministry of Health, Labour and Welfare. The National Health and Nutrition Survey, 2010. http://www.mhlw.go.jp/bunya/kenkou/eiyou/dl/h22-houkoku-10.pdf (Accessed 28 August 2012).
2) Health, Labour and Welfare Statistics Association. Live birth. J Health Welfare Stat 2012; 59(9): 51.
3) Ministry of Health, Labour and Welfare. The National Growth Survey on Preschool Children, 2010. http://www.mhlw.go.jp/stf/houdou/2r9852000001t3so.html (Accessed 28 August 2012).
4) Schneider S, Huy C, Schütz J, et al. Smoking cessation during pregnancy: a systematic literature review. Drug Alcohol Rev 2010; 29: 81–90.
5) Kaneita Y, Tomofumi S, Takemura S, et al. Prevalence of smoking and associated factors among pregnant women in Japan. Prev Med 2007; 45: 15–20.
6) Ohida T, Kaneko A, Kaneita Y, et al. Investigation into relevant factors of parents' smoking before and during pregnancy, and after birth. In: FY2005 Report of Research on Technical Support for Local Health Promotion Plan. Tokyo: Department of Health Policy Science, Tokyo Medical and Dental University, 2006: 117–130.
7) Yasukouchi S, Sato K. Factors that affect the smoking behavior of women from pregnancy to the postpartum period: a survey 4 months after delivery. Jpn J Mat Health 2006; 47: 372–379.
8) Moon RY, Horne RS, Hauck FR. Sudden infant death syndrome. Lancet 2007; 370: 1578–1587.
9) Samoliński B, Fronczak A, Włodarczyk A, et al. Council of the European Union conclusions on chronic respiratory diseases in children. Lancet 2012; 379: e45–e46.
10) McKee SA, Maciejewski PK, Falba T, et al. Sex differences in the effects of stressful life events on changes in smoking status. Addiction 2003; 98: 847–855.
11) Tanaka N, Saito H. The factor which influences behavior modification to cessation of smoking during pregnancy. Jpn J Mat Health 2007; 47: 660–666.
12) Health, Labour and Welfare Statistics Association. Stillbirth. J Health Welfare Stat 2012; 59(9): 65.
13) Jha P, Brown P. Global trends in tobacco use. In: Jha P, Chaloupska FJ. Curbing the Epidemic: Governments and the Economics of Tobacco Control. Washington, D.C.: The World Bank, 1999: 13–20.

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妊婦の喫煙継続に関連する要因：日本の一都市での横断研究

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目的：妊娠の喫煙継続に関連する要因を検討すること．
方法：この横断研究の母集団は，2004年４月１日から2006年３月31日までに，日本の一都市の保健センターを，妊娠届出のために訪れたすべての妊婦であった．該当した妊婦は2,536人であり，2,533人（99.9%）が研究に参加した．自記式調査票により，2,511人（99.0%）から有効回答を得た．届出時の喫煙継続に関連する要因は，最初にχ^2検定で検討された．その後，χ^2検定で有意であった項目を独立変数とし，届出時の喫煙継続状況を従属変数として，強制投入法による多重ロジステック回帰分析を行った．
結果：喫煙継続者は232人（9.2%），妊娠後の禁煙者は397人（15.8%）であった．届出時の喫煙継続は，「パートナーの喫煙」「経済的不安や相談の有無」「過去に妊娠経験がある者」「妊娠届出が妊娠12週以降」の４変数と有意に関連していた．
結論：妊娠届出時まで喫煙を継続する妊婦を減らすためには，妊婦のパートナーの喫煙率を下げることや，経済不安の解消に向けた努力が，意味を持つ可能性が示唆された．

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